Furthermore, the over fortified formulations may overwhelm the digestive tract with non-soluble lipophilic compounds leading to indigestion.

[0005] Accordingly, there is a need for nutritional compositions for infants, toddlers, children and adults that provide necessary lipophilic compounds in a more stable soluble form.

SUMMARY OF THE INVENTION

[0005a] A method of preparing a nutritional composition having at least one lipophilic compound having improved bioavailability, the method comprising the steps of:

providing a premix comprising an assembly that comprises at least one hydrophobic protein having a grand average of hydropathicity index (GRAVY) value of -0.5 to 0, a combination of monoglycerides and diglycerides ("MDG"), and at least one lipophilic compound, wherein the assembly (i) is water soluble wherein at least 5% of the assembly remains in an aqueous phase after centrifugation at 31,000 x g for at least 1 hour at 20 °C; and (ii) has a size of 60 kD to 1000 kD;

adding the premix to an aqueous solution to form an activated premix; and

adding the activated premix to the nutritional composition.

[0005b] A method of preparing a nutritional composition having at least one lipophilic compound having improved bioavailability, the method comprising the steps of:

providing a protected premix comprising an assembly that comprises at least one hydrophobic protein having a grand average of hydropathicity index (GRAVY) value of -0.5 to 0, a combination of monoglycerides and diglycerides ("MDG"), at least one lipophilic compound, and a surfactant, wherein the assembly (i) is water soluble wherein at least 5% of the assembly remains in an aqueous phase after centrifugation at 31,000 x g for at least 1 hour at 20 °C; and (ii) has a size of 60 kD to 1000 kD;

adding the protected premix to a fat-containing solution to form an MDG-protected component; and

adding the MDG-protected component to the nutritional composition.

[0006] In one aspect, the disclosure may be directed to a nutritional composition having at least one protein, at least one fat, and at least one lipophilic compound, the composition comprising: an activated assembly comprising at least one hydrophobic protein, at least one

CLAIMS

What is claimed is:

1. A method of preparing a nutritional composition having at least one lipophilic compound having improved bioavailability, the method comprising the steps of:

providing a premix comprising an assembly that comprises at least one hydrophobic protein having a grand average of hydropathicity index (GRAVY) value of -0.5 to 0, a combination of monoglycerides and diglycerides ("MDG"), and at least one lipophilic compound, wherein the assembly (i) is water soluble wherein at least 5% of the assembly remains in an aqueous phase after centrifugation at 31,000 x g for at least 1 hour at 20 °C; and (ii) has a size of 60 kD to 1000 kD;

adding the premix to an aqueous solution to form an activated premix; and

adding the activated premix to the nutritional composition.

2. The method of claim 1, wherein the assembly has a size of 60 kD to 400 kD.

3. The method of claims 1 or 2, wherein the lipophilic compound is a carotenoid, a lipid soluble vitamin, a lipophilic antioxidant or combinations thereof.

4. The method of claims 1-3, wherein the lipophilic compound is lutein, vitamin A, vitamin D, vitamin E, vitamin K, docosahexaenoic acid (DHA), or combinations thereof.

5. The method of claims 1-4, wherein the premix is heated to a temperature of 120 °F for about 10 minutes.

6. A method of preparing a nutritional composition having at least one lipophilic compound having improved bioavailability, the method comprising the steps of:

providing a protected premix comprising an assembly that comprises at least one hydrophobic protein having a grand average of hydropathicity index (GRAVY) value of -0.5 to 0, a combination of monoglycerides and diglycerides ("MDG"), at least one lipophilic compound, and a surfactant, wherein the assembly (i) is water soluble wherein at least 5% of the assembly remains in an aqueous phase after centrifugation at 31,000 x g for at least 1 hour at 20 °C; and (ii) has a size of 60 kD to 1000 kD;

adding the protected premix to a fat-containing solution to form an MDG-protected component; and

adding the MDG-protected component to the nutritional composition.

7. The method of claim 6, wherein the assembly has a size of 60 kD to 400 kD.

8. The method of claims 6 or 7, wherein the lipophilic compound is a carotenoid, a lipid soluble vitamin, a lipophilic antioxidant or combinations thereof.

9. The method of claim 8, wherein the lipophilic compound is lutein, vitamin A, vitamin D, vitamin E, vitamin K, docosahexaenoic acid (DHA), or combinations thereof.

10. The method of claims 6-9, wherein the premix is heated to a temperature of 120 °F for about 10 minutes.